Why was the solar wind measured during PSP's second perihelion suddenly tenuous and less variable?

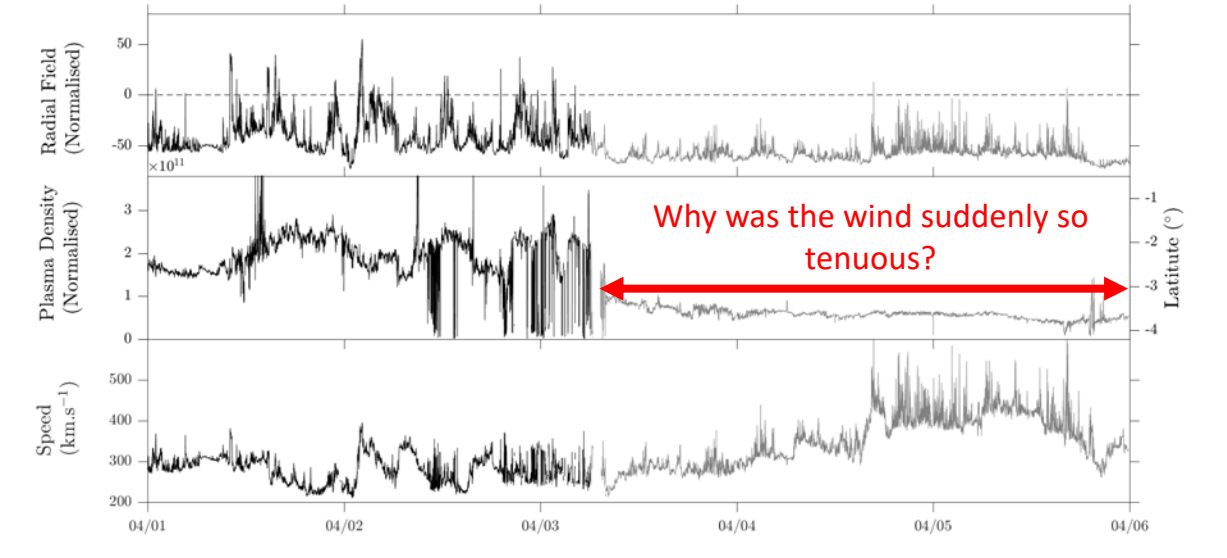
(reference: Rouillard et al., 2020, ApJS, 246, 37)

The physical mechanisms that produce the slow solar wind are still highly debated. Parker Solar Probe's (PSP's) second encounter provided an opportunity to measure the nascent slow solar wind and establish connections with solar wind source regions imaged near the solar corona.

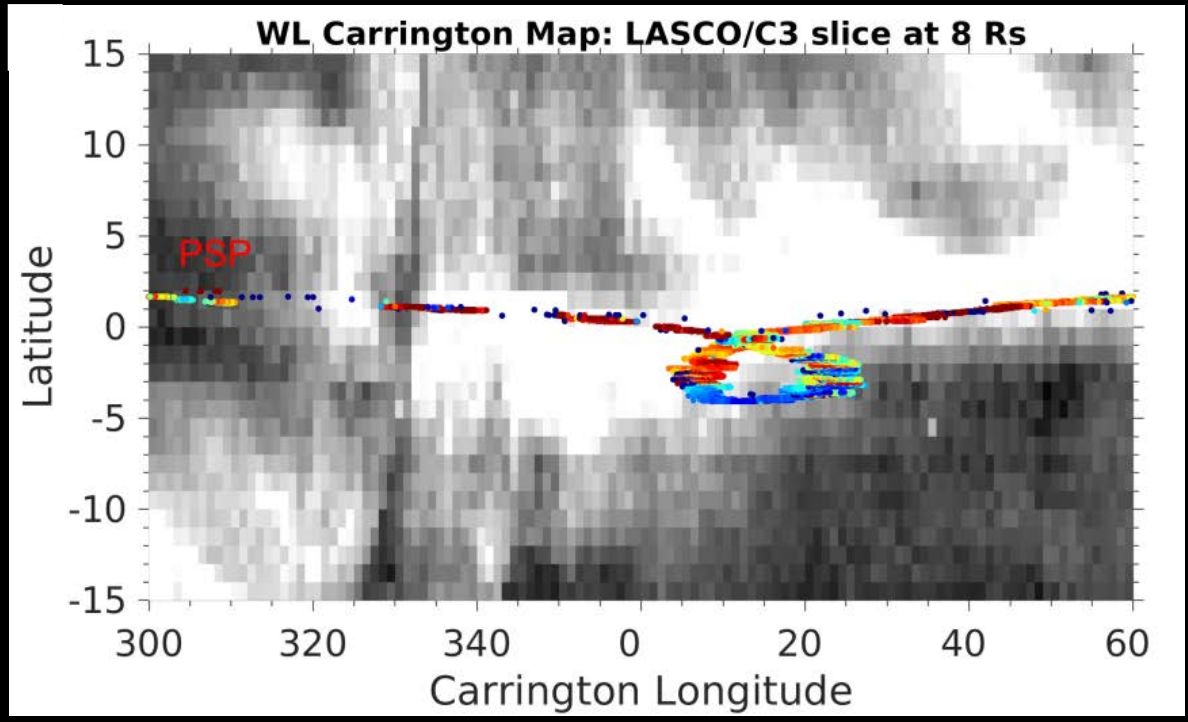
During this encounter the SWEAP and FIELDS instruments measured a sharp transition in solar wind properties on the 3rd of April visible in the Figure below. **Was it due to the sudden proximity of PSP to the Sun or a change of plasma source near the Sun?**

- Sharp drop in solar wind density
- Sudden decrease in magnetic field variability

Rouillard et al. 2020 exploited coronagraph images taken by the Solar and Heliospheric Observatory (SOHO) to see if PSP crossed different plasma sources that could explain these sudden changes in solar wind properties.



Solar wind measured by Parker Solar Probe close to the second perihelion that occurred on the 5th of April 2019.



A latitude versus longitude map of the coronal brightness observed by the SoHO spacecraft at at distance of 8 solar radii from the Sun. Parker Solar Probe's trajectory on this map is shown in color. The color code corresponds to the plasma density.

The plasma properties measured by PSP were used to trace back ballistically the source locations of the wind in coronagraphic images. A comparison is shown in the above figure.

Rouillard et al. (2020) found that the sudden change in plasma density measured by PSP was induced by the spacecraft's rapid change in latitude near perihelion. The spacecraft spent most of the second encounter inside streamers and, as it moved southwards, suddenly exited the dense plasma released from the streamers to enter more tenuous plasma that was likely expelled from a coronal hole.